

ABSTRACT

The ideal extraction method of bioactive compounds from *Ulva lactuca* was developed and optimised to achieve the maximum yield of the compounds. *U. lactuca* was investigated for their vitamin B12 content, carotenoids (β -carotene and fucoxanthin), flavonoid (quercetin), protein and amino acid profiles, and polysaccharides (ulvan). The effects of several extraction parameters, including the solvent-to-solvent ratio, solute-to-solvent ratio, pH, duration of extraction and extraction temperature on the total bioactive compounds of interest content, were analysed through a Two-level Factorial and Central Composite Designs. Other pre-treatment of drying methods (sun-dry, air-dry, oven-dry and freeze-dry) were applied during the extraction process. Results showed that *U. lactuca* extract was characterised by a high content of ulvan (32.0 %), followed by proteins (27.3 %), carotenoids, flavonoid and vitamin B12. The polysaccharides of ulvan contain L-rhamnose, xylose and glucose. The proteinic fraction analysis indicated the presence of essential amino acids, which represent 42.0% of the total amino acids. The carotenoids profile was represented by β -carotene, which about 16.0 % of the total carotenoid content, followed by fucoxanthin (11.0 %). Data analysis resulted in optimal extraction condition were noted as per discussed.

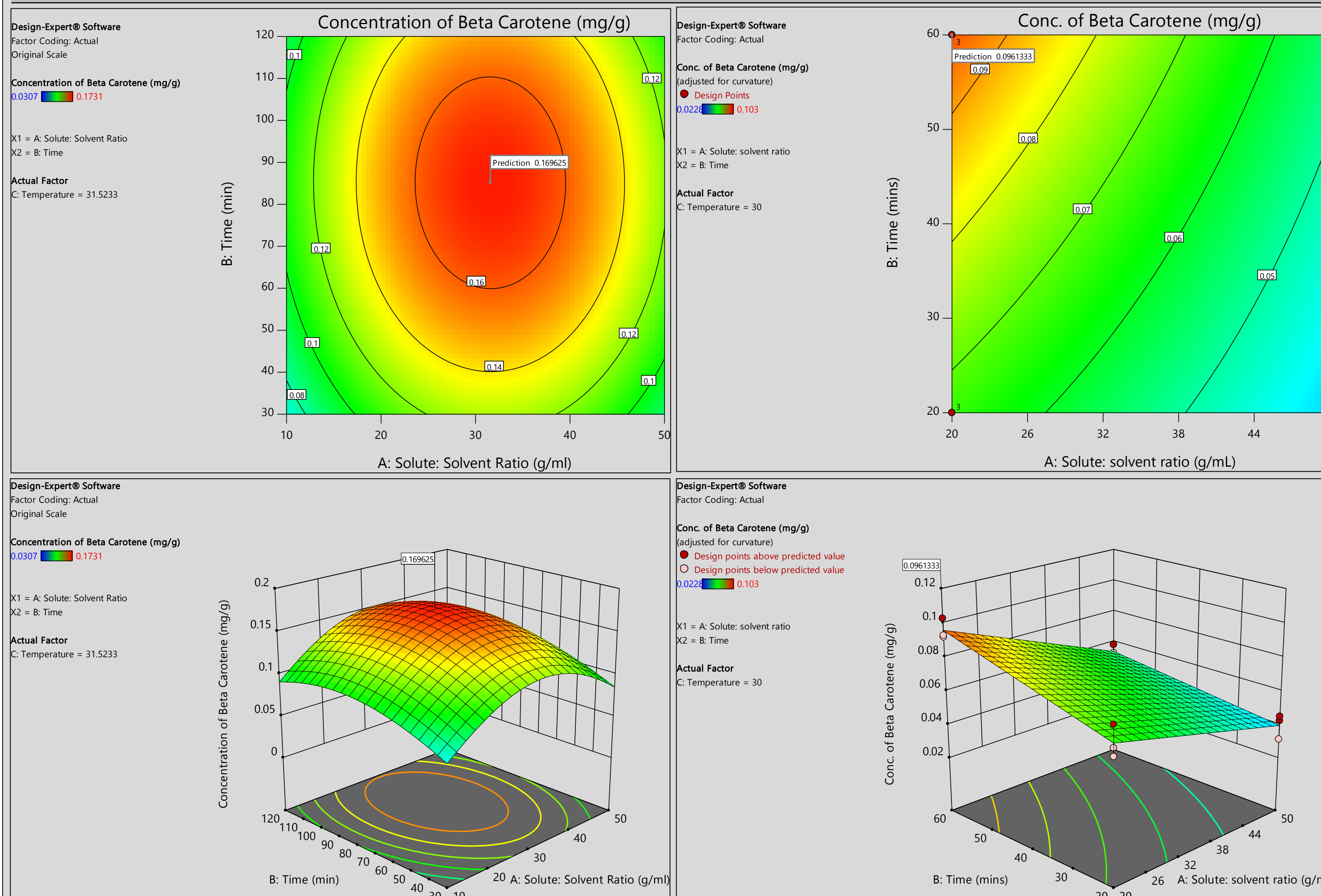
BACKGROUND

Ulva lactuca is a macroalgae and belongs to the phylum *Chlorophyta*. It involved in devastating green tides observed worldwide. These green tides or blooms are a consequence of human activities. *Ulva* blooms occur mainly in shallow waters and the decomposition of this algae can produce dangerous vapors. *U. lactuca* can rapidly proliferate by covering the water surface, decreasing the biodiversity even for other algae species. It is a polymorphic species with morphologies dependent on the degree of water salinity or symbiosis with bacteria. No efficient ways have been discovered to control these green tides. Interestingly, *Ulva* contains commercially valuable components susceptible of being exploited for cosmetic, pharmaceutical, chemical, food and energy applications and this study provides a background on products that might be obtained from *U. lactuca*, as well as the suitable extraction methods and optimized parameters that can be used to date.

DISCUSSION

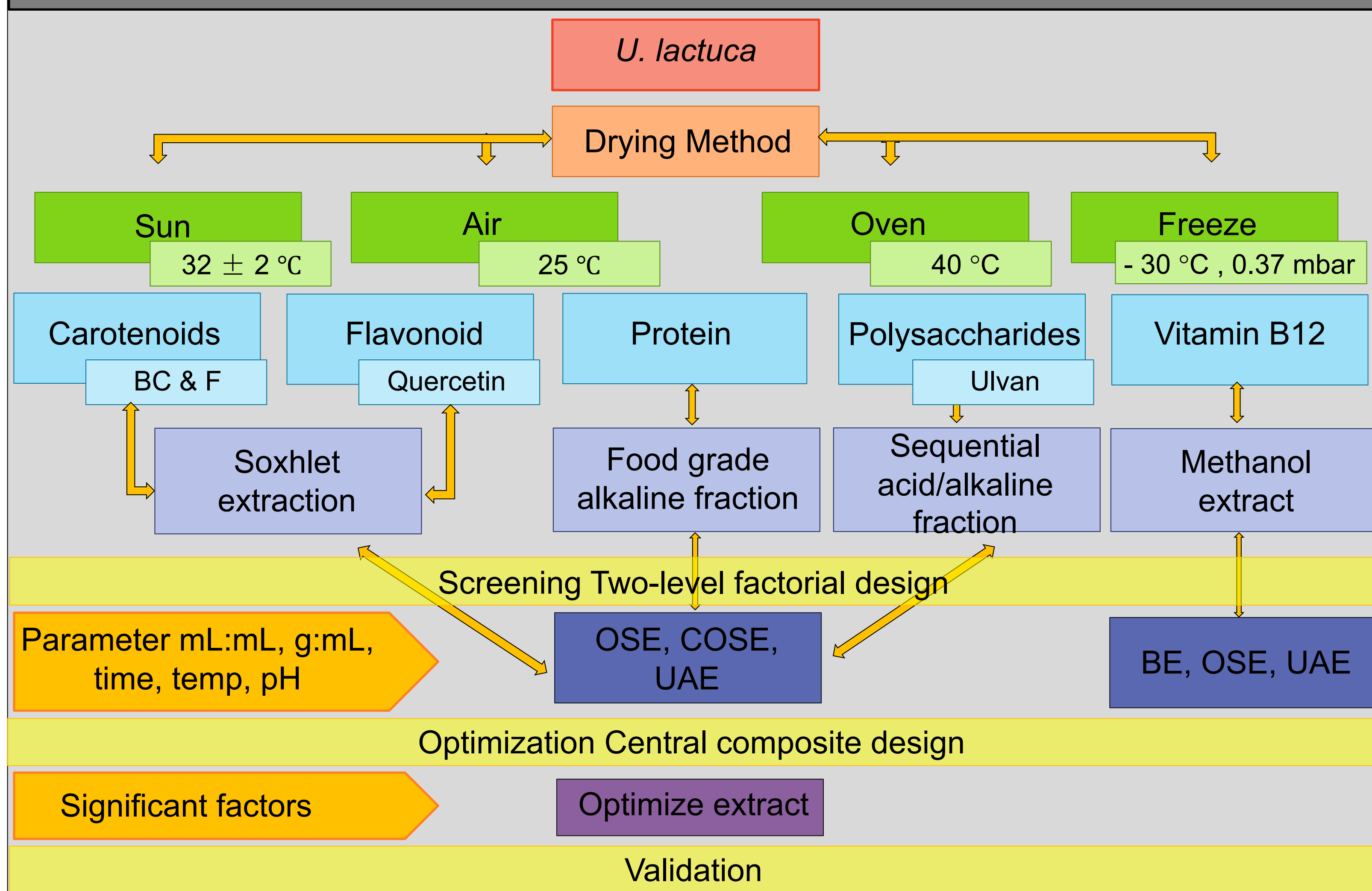
Analysis of variance (ANOVA) for optimised β -carotene content from *U. lactuca* extract.

Source	Sum of Squares	df	Mean Square	F-value	p-value
Model	0.1807	9	0.0201	430.37	< 0.0001 significant
A-Solute: Solvent Ratio	0.0042	1	0.0042	89.14	< 0.0001
B-Time	0.0080	1	0.0080	171.61	< 0.0001
C-Temperature	0.0203	1	0.0203	435.82	< 0.0001
AB	0.0000	1	0.0000	0.2336	0.6329
AC	0.0000	1	0.0000	0.8187	0.3739
BC	6.075E-06	1	6.075E-06	0.1302	0.7211
A ²	0.0510	1	0.0510	1094.04	< 0.0001
B ²	0.0130	1	0.0130	278.50	< 0.0001
C ²	0.0310	1	0.0310	663.32	< 0.0001
Residual	0.0012	26	0.0000		
Lack of Fit	0.0008	5	0.0002	8.22	0.0002 significant
Pure Error	0.0004	21	0.0000		
Cor Total	0.1819	35			



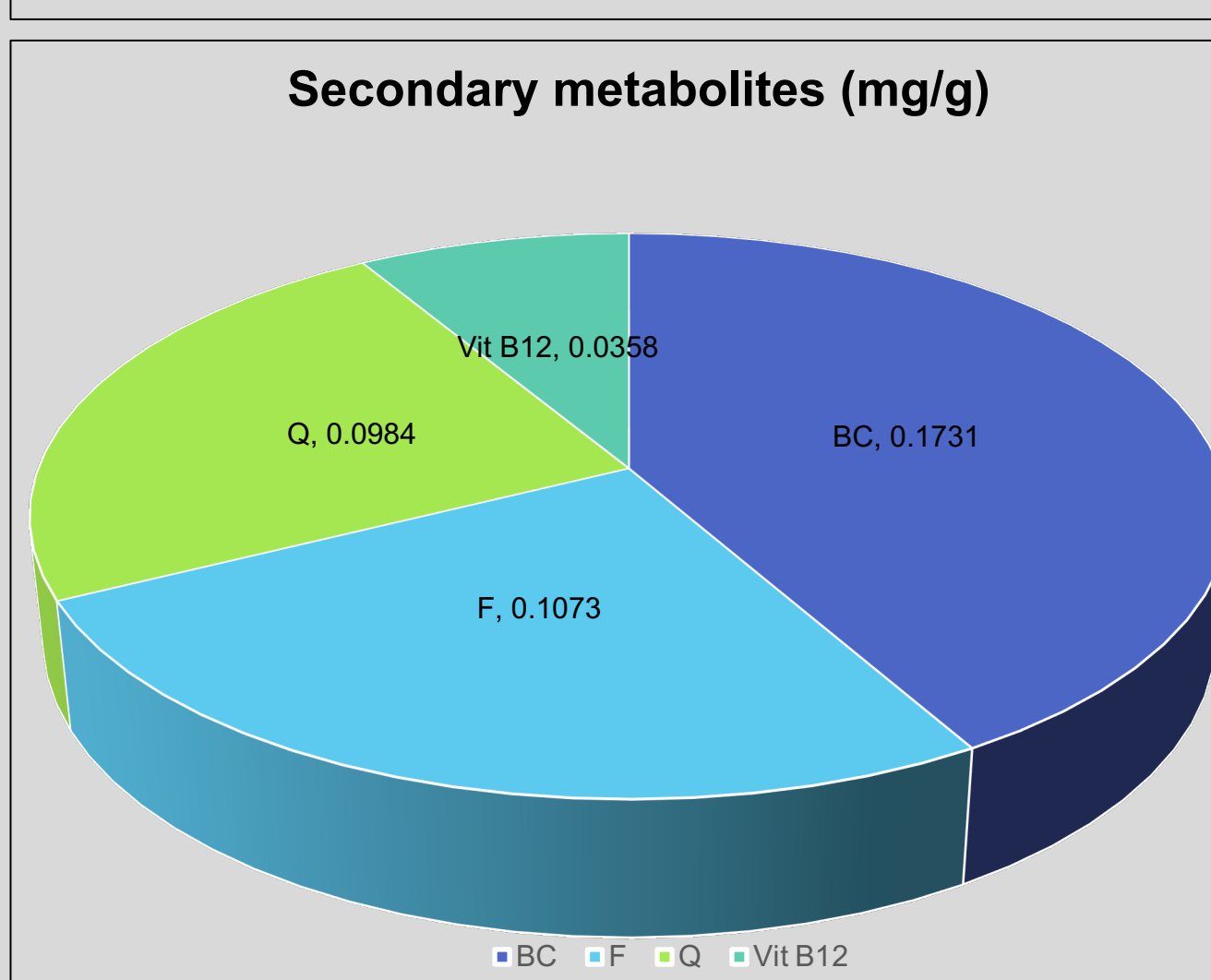
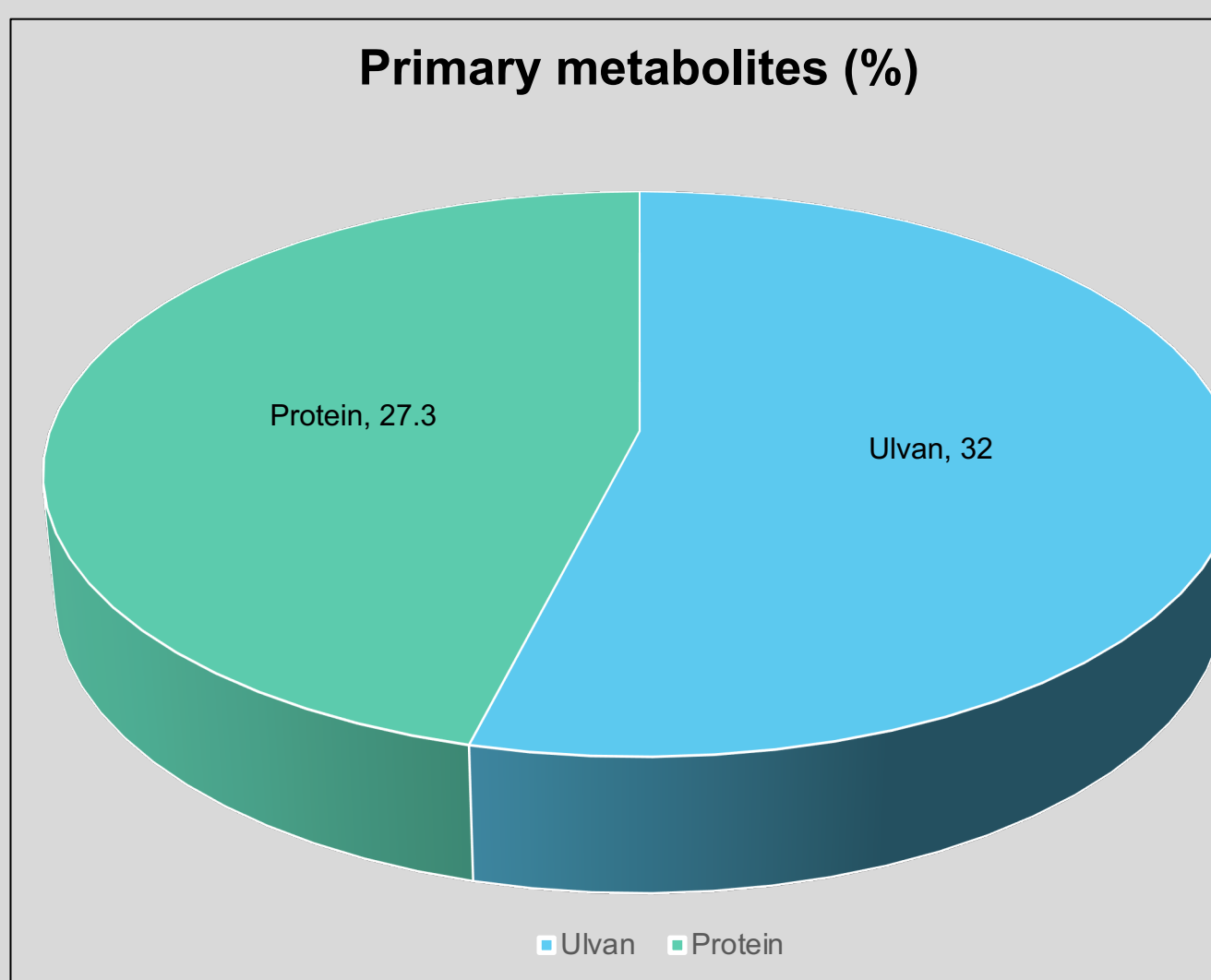
Surface response for the desirability and concentration of β -carotene recovered as a function of (a) AB interaction in contour plot and (b) AB interaction in the 3D surface plot.

METHODS



RESULTS AND DATA

Std	Run	Factors			Concentration	
		Solute: Solvent ratio (g/mL)	Extraction Duration (min)	Temperature (C)	ppm	mg/g
1	24	10	30	20	5.1168	0.0512
2	4	10	30	20	5.491	0.0549
3	9	10	30	20	5.2894	0.0529
4	11	50	30	20	6.8609	0.0686
5	14	50	30	20	6.9184	0.0692
6	5	50	30	20	6.7995	0.068
7	16	10	120	20	7.2586	0.0726
8	3	10	120	20	7.5441	0.0754
9	7	10	120	20	7.7305	0.0773
10	29	50	120	20	8.0816	0.0808
11	13	50	120	20	8.7342	0.0873
12	21	50	120	20	8.3867	0.0839
13	28	10	30	50	3.1064	0.0311
14	36	10	30	50	3.3823	0.0338
15	17	10	30	50	3.0748	0.0307
16	23	50	30	50	3.9901	0.0399
17	32	50	30	50	4.1484	0.0415
18	15	50	30	50	4.0963	0.041
19	10	10	120	50	4.1587	0.0416
20	18	10	120	50	4.3409	0.0434
21	30	10	120	50	4.3637	0.0436
22	20	50	120	50	5.8901	0.0589
23	8	50	120	50	5.7004	0.057
24	12	50	120	50	5.8468	0.0585
25	26	2	75	35	6.3071	0.0631
26	19	58	75	35	7.2548	0.0726
27	31	30	12	35	9.8175	0.0982
28	1	30	138	35	12.4148	0.1242
29	35	30	75	14	10.1336	0.1013
30	22	30	75	56	7.1413	0.0714
31	2	30	75	35	15.8965	0.159
32	6	30	75	35	17.3117	0.1731
33	27	30	75	35	16.4818	0.1648
34	33	30	75	35	15.9986	0.16
35	34	30	75	35	16.7348	0.1674
36	25	30	75	35	16.5401	0.1654

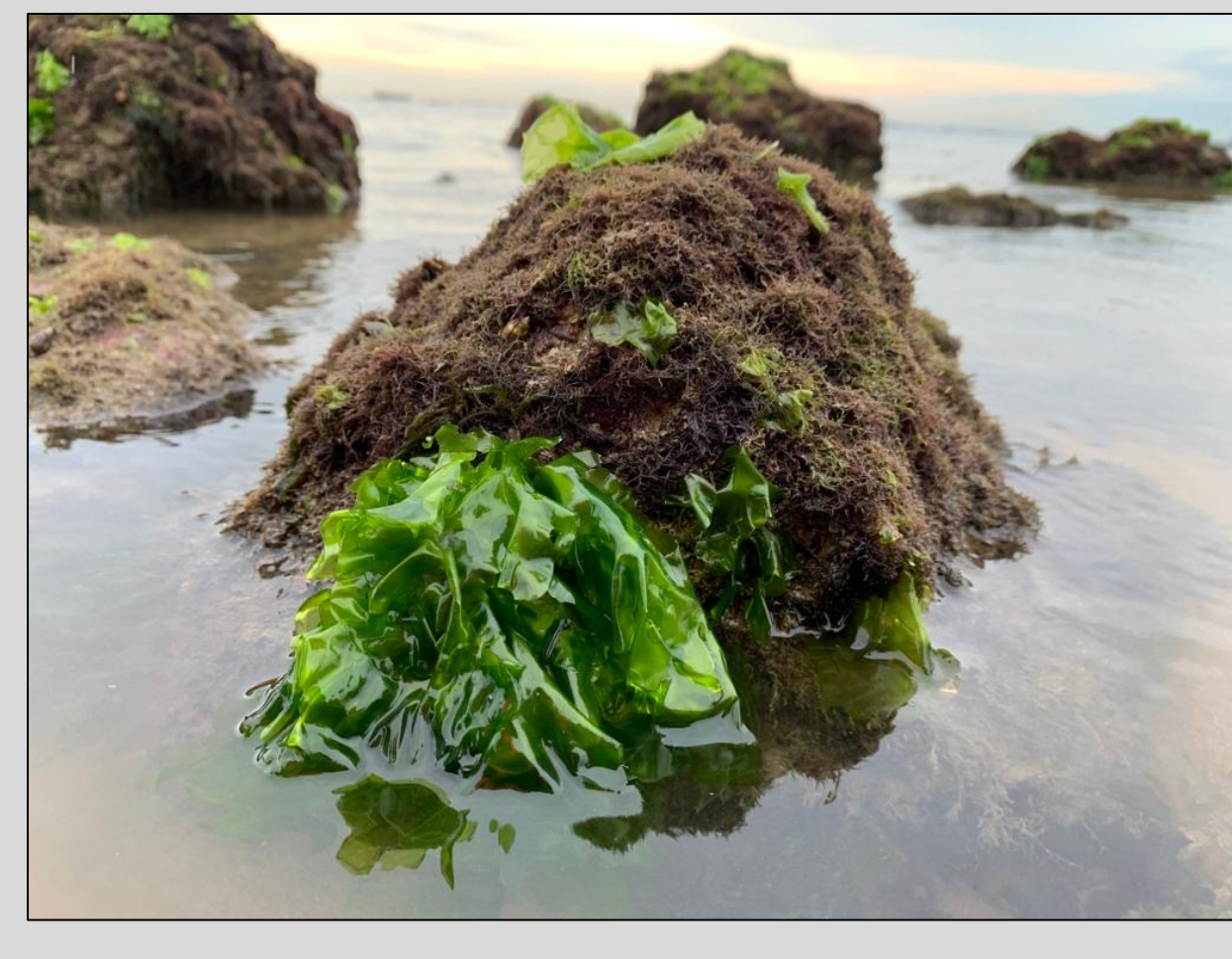


CONCLUSION

Optimal factors predicted by Central Composite Design

	A	B	C	D	E
β -carotene	-	1:31	84 min	32	-
Fucoxanthin	-	1:52	87 min	34	-
Quercetin	-	1:52	84 min	34	-
Vit B12	25:75 MeOH:	-	-	-	4
Protein	-	1:25	3 h	75	-
Ulvan	-	-	2 h	85	2.5

A: solvent:solvent ratio (mL:mL) D: Temperature (°C)
B: solute:solvent ratio (g:mL) E: pH
C: Time (min)



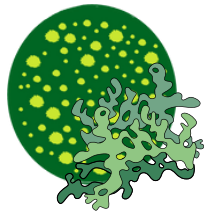
U. lactuca

ACKNOWLEDGEMENT

This research was funded by MINISTRY OF HIGHER EDUCATION (MOHE) MALAYSIA through the Fundamental Research Grant Scheme, grant number FRGS/1/2019/WAB01/UIAM/02/5.

REFERENCE

Susanti, D., Ruslan, F. S., Shukor, M. I., Nor, N. M., Aminudin, N. I., Taher, M., & Khotib, J. (2022). Optimisation of Vitamin B12 Extraction from Green Edible Seaweed (*Ulva lactuca*) by Applying the Central Composite Design. *Molecules*, 27(14). <https://doi.org/10.3390/molecules27144459>



GAS 2023

Global Algae Summit

Abstract e-book

PAVING THE FUTURE OF CIRCULAR ALGAE BIOECONOMY

17th Aug 2023

09:30 AM - 18:00 PM

Azman Hashim Hall UTM-KL



Organisers



Session Partner



Strategic Partner



University Partners



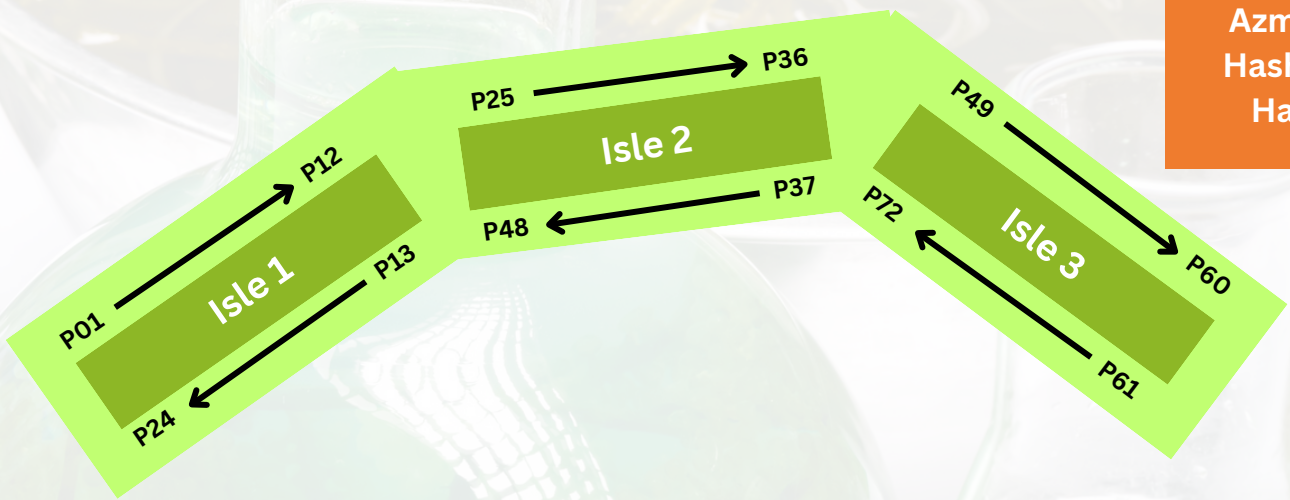
PROGRAM TIMELINE

TIME	AGENDA
8:45 - 9:00	Arrival of delegates
9:00 - 9:30	MoA ceremony (Euglena & UTM)
9:30 - 10:00	Registration [Booth exhibition]
10:00 - 10:15	Welcoming Ceremony
10:15 - 10:45	Keynote Speech: "Meeting the Challenges of Establishing an Algal Industry" Emeritus Professor Dr. Phang Siew Moi FASc, FMBA (UK)
10:45 - 11:00	Refreshment / Break [Booth exhibition]
11:00 - 12:00	Panel Discussion 1: "Essentials in Building a Thriving Algae Ecosystem"
12:00 - 13:00	Poster Session
13:00 - 14:00	Lunch Break [Booth exhibition]
14:00 - 14:30	Booth exhibition & Poster discussion
14:30 - 15:30	Panel Discussion 2: Exploring the Potential of Algae-based Healthcare Solutions: A Global Perspective
15:30 - 15:45	Refreshment / Break [Booth exhibition]
15:45 - 16:30	Pocket Talks: Pioneering a Sustainable Algae Revolution
16:30 - 17:30	Panel Discussion 3: Advancing Algae-Based Biofuel for Green Energy Alternatives
17:30 - 18:00	Awards and Closing Ceremony
18:00~	Networking [Booth exhibition]

FLOOR PLAN

Poster Anjung Razak

**Azman
Hashim
Hall**



Legend:



- Poster panel
- Isle 1: P01 - P24
- Isle 2: P25 - P48
- Isle 3: P49 - P72

CONTENTS

Poster number	Title
P01	Skin Allergenicity of Airborne and Soil Algae Isolated from Malaysia Harn-Li Juay, Wan-Loy Chu, Shew-Fung Wong, Siew-Moi Phang, and Yih-Yih Kok
P02	Morphology and nutritional composition of <i>Gracilaria changii</i> Grown in Muar, Johor Nurulain Najwa Suhaimai, Shahidah Md Nor, and Norhayati Muhammad
P03	Alginate Bead Encapsulation Technique for Bioactive Compounds Enhancing Viability and Stability Siti Fairuz Che Othman
P04	Revolutionizing Aqua Farming with Microalgae as Aqua Feed Lavanya A/P Anbalagan, Azieyati Hani binti Hussain, Ramizah binti Kamaludin, Tang Hock Wei, and Charles Ng Wai Chun
P05	Determination of mineral composition of microalgae isolated from Antarctic soil for potential application as aquaculture feed Zaima Azira Zainal Abidin, Zarina Zainuddin, Sarah Kamilia Rosmiza Anuar Khair, and Ahmed Jalal Khan Chowdhury
P06	Kinetics Growth and Recovery of Valuable Nutrients from Selangor Peat Swamp and Pristine Forest Soils Using Different Extraction Methods as Potential Microalgae Growth Enhancers Nor Suhaila Yaacob, Mohd Fadzli Ahmad, Maegala Nallapan Maniyam, Hasdianty Abdullah, Emi Fazlina Hashim, Fridelina Sjahrir, and Wan Muhammad Ikram Wan Mohd Zamri
P07	Optimization of extraction procedures for nutritional composition from the marine macroalgae <i>Ulva lactuca</i> as a potential cosmetic activity Deny Susanti, Muhammad Idham Shukor, Normawaty Mohammad Nor, Nurul Iman Aminuddin, and Muhamad Taher
P08	Evaluation of tropical forest soil extracts as the growth-promoting agent on marine microalgae species Mohd Fadzli Ahmad, Hasdianty Abdullah, Fridelina Sjahrir, Maegala Nallapan Maniyam, Emi Fazlina Hashim, Noor Fazreen Dzulkifli, and Nor Suhaila Yaacob
P09	The Influence of Selangor Peat Swamp and Pristine Forest Soil Extracts on the Green Microalgae sp. Growth Hasdianty Abdullah, Mohd Fadzli Ahmad, Fridelina Sjahrir, Maegala Nallapan Maniyam, Emi Fazlina Hashim, Noor Fazreen Dzulkifli, and Nor Suhaila Yaacob
P10	Algae cultivation systems integrated with photovoltaic cell: a systematic review M.S.N. Atikah and Razif Harun
P11	Neuroregeneration potential of <i>Gracilaria manilaensis</i> Yamamoto & Trono in the treatment of peripheral nerve injury Nyiew Ke Ying, Wong Kah Hui, Lim Lee Wei, Lim Siew Huah, and Yow Yoon Yen
P12	Improving microalgae growth and carbon capture through micro-size bubbles generation in flat-panel photobioreactors Yi An Lim, I.M.S.K. Ilankoon, Meng Nah Chong, and Su Chern Foo

CONTENTS

Poster number	Title
P13	Biogranulation of Microalgae Vel Murugan Vadivelu
P14	Novel Floating Photobioreactor with Wave-induced Mixing Khor Wei Han, Dr. Tang Howe Hing, Dr. Kang Hooi Siang, and Prof. Koji Iwamoto
P15	Anti-melanogenic effect of brown alga <i>Sargassum aquifolium</i> (Turner) C.Agardh Kai Xuan Lim, Bey Hing Goh, You-Jin Jeon, and Yoon Yen Yow
P16	Nutrient Analysis of Microalgae for Commercial Use Yussyazana Binti Yusuf
P17	Biosorption efficacy of alginate-immobilized live and metal chloride-activated <i>Azolla microphylla</i> in Pb(II) removal from aqueous solution ZAlicia Hui-Ying Khor, Kok-Song Lai, Hon-Jung Liew, and Jiun-Yan Loh
P18	Evaluation of Phytochemical, Antioxidant and Anticancer Activities of Methanolic and Chloroformic Extracts from Filamentous Cyanobacterium <i>Anabaena sp.</i> and <i>Desertifilium sp.</i> Against (A549) Lung Cancer Cell Line Reem Abdulsalam Dawood Al-Nedawe and Zetty Norhana Balia Yusof
P19	Bio-coating for Attached Microalgae Growth Derek Chan Juinn Chieh and Cheah Yi Tong
P20	Photoprotective Potential of Mycosporine-Like Amino Acids (MAAs) and Bioactive Compounds from Antarctic Microalgae on Human Keratinocytes Kiat Fatt Chia, Chooi Ling Lim, Chiew Yen Wong, Rhun Yian Koh, Choy Sin Lee, Soi Moi Chye, Yih Yih Kok, Siti Aqlima Ahmad, Peter Convey and Leyla Cardenas
P21	Local seaweeds as a source for nanocellulose production Haslin Hanani Md. Zaini, Normawaty Mohammad-Noor, and Zarina Zainuddin
P22	Control and manipulation of algal ecosystems for sustainable development and adaptation to climate change Chin Sean Young, Sagathevan Kuppusamy, Affendi Bin Yang Amri, and Chen Jit Ern
P23	The Potential of Soil Extract from Royal Belum as A Growth Enhancer for <i>Chlorella Spp.</i> Fridelina Sjahrir, Wan Muhammad Ikram Wan Mohd Zamri, Nor Suhaila Yaacob, Mohd Fadzli Ahmad, Maegala Nallapan Maniyam, Noor Fazreen Dzulkafli, Hasdiyanty Abdullah, Emi Fazlina Hashim, Kazuhiro Komatsu, and Victor Kuwuhara
P24	Potential of Microalgae Nostoc and Chlorella in Freshwater Arsenic Bioremediation Tang Wenn Wenn and Foo Su Chern
P25	<i>Acutodesmus obliquus</i> and a mixed culture of <i>Haematococcus pluvialis</i> with <i>Coelastrum sp.</i> , as a promising source of biodiesel Dewi Amelia Binti Khamis

CONTENTS

Poster number	Title
P26	Algae Printed Living Materials: Potential & Challenges Nurul Afiqah Mohd Ma'asom and Irina Harun
P27	Enhancement of Phycobiliprotein Production of <i>Arthrospira Sp.</i> Through Symbiotic Bacteriamicroalgae Interaction Hui Teng Tan, Fatimah Md. Yusoff, Siti Aqlima Ahmad, Noor Azmi Shaharuddin, and Tatsuki Toda
P28	Unveiling the stimulant properties of Langkawi Island virgin soils for microalgae growth: An approach of molecular size fractionation Emi Fazlina Hashim, Kazuhiro Komatsu, Nor Suhaila Yaacob, Matsumi Sekine, Masahiro Ohtake, and Tatsuki Toda
P29	Could SmtCL-1 Long Terminal Repeats (LTR) Retrotransposons in Endosymbiont Algae Symbiodinium Save Our Corals from Extinction? Aisamuddin Ardi Zainal Abidin, Lim Shyang Jye, Elisa Schaum, Zetty Norhana Balia Yusof, and Chen Jit Ern
P30	Microalgae as Bioindicator for Environmental Pollutants: Polystyrene Nanoplastic and Atrazine Herbicide Wen Cong Gan, Chiew Yen Wong, Yih Yih Kok, Choy Sin Lee, Boon Keat Tan, Yoon Yen Yow, and Siew Moi Phang
P31	Utilising Flue Gas on Microalgae Growth: Towards Sustainable Carbon Capture and Circular Economy in Sarawak Jessreen Tega, Nur Emyliana Yunos, Mohamed Nur Azim Bin Mazlan, Mohamad Faiqwan Bin Mohamad Hamdan, Alicia Vanessa Jeffary, Mohd Nazirin Bin Abdul Rahman, Keekoti Sue Betin, Mohd Fadeli Bin Jemat, Hii Mei Mei, and Yeo Tiong Chia
P32	High-value microalgae in Malaysia: <i>Thalassiosira weissflogii</i> and <i>Isochrysis galbana</i> Muhammad Faiz Zakaria, Aliffikri Ramlee, Ahmad Hanafi Mohd Kamal, Tomoyo Katayama, Mohd Effendy Abd Wahid, and Malinna Jusoh
P33	Algae-Based Phytoremediation: A Highly Promising Strategy for Environmental Cleanup Chiew-Yen Wong, Zheng Syuen Lim, Nurul Aini Puasa, Gayathiri Verasoundarapandian, Siti Hajar Bt. Mohd Taufik, Syahirah Batrisyia Radziff, Nur Diyanah Zamree, Siti Aqlima Ahmad, Yih-Yih Kok, Faradina Merican, Azham Zulkharnain, Claudio Gomez-Fuentes, and Peter Convey
P34	Evaluation of Phycobiliproteins and their Antioxidant Activity from Blue-Green Algae <i>Microcystis sp.</i> and <i>Anabaena sp.</i> under Salinity Stress Nur Hazzylia Badrul, Nur Madihah Ismail, and Zetty Norhana Balia Yusof
P35	<i>Chlorella sp.</i> as a Potential Anticancer Remedy: Evaluation of Toxicity, Antibacterial, Total Phenolic and Flavonoid Contents Ikliil Wajihah Harun, Nurin Fatinah Mustafa Kamal, and Zetty Norhana Balia Yusof
P36	Protective effects of red alga <i>Kappaphycus alvarezii</i> against particulate matter-induced airway inflammatory responses in BEAS-2B cell line. Shobna Thuraisingam
P37	De novo Genome Sequencing of EPA-Producing Marine Microalga <i>Thalassiosira weissflogii</i> TRG10-p105 Ahmad Hanafi Ahmad Kamal, Mohd Effendy Abdul Wahid, Tomoyo Katayama, and Malinna Jusoh

CONTENTS

Poster number	Title
P38	Use of Aquaculture Wastewater as Growth Medium for Cultivation of Freshwater Microalgae, <i>Chlorella sp</i> and <i>Chlorococcum sp</i> Used as Feed in Aquaculture Industry Emienour-Muzalina Mustafa, Muhamad Zuraidi bin Zainon, Norfazilah bt Salim, and Siew-Moi Phang
P39	Bioremediation of Diesel Hydrocarbons Using an Antarctic Microalga from Deception Island Nurul Aini Puasa, Siti Aqlima Ahmad, Chiew Yen Wong, Noor Azmi Shaharuddin, Faradina Merican, Azham Zulkharnain, and Peter Convey
P40	The Utilisation of an Antarctic Microalga Isolated from Paradise Bay (Antarctic Peninsula) in the Bioremediation of Diesel Nur Diyanah Zamree, Nurul Aini Puasa, Siti Aqlima Ahmad, Chiew Yen Wong, Noor Azmi Shaharuddin, Faradina Merican, and Peter Convey
P41	Microalgae Serve as Reliable Bioindicators for the Presence of Heavy Metals, Micro- and Nano-plastics in Antarctica Poi-Yi Aw Yong, Yih-Yih Kok, Chiew-Yen Wong, Boon-Keat Tan, Peter Convey, Siew-Moi Phang, Siti Aqlima Ahmad, and Azham Zulkarnain
P42	Toxicity and Gas Chromatography-Mass Spectrometry (GC-MS) Analysis of <i>Chlorella vulgaris</i> Lipid Extract Syahida Ahmad, Amirah Mohd Yuzanai, Siti Aqlima Ahmad, Noor Azmi Shaharuddin, Chiew Yen Wong, and Peter Convey
P43	Biodegradation of Diesel Hydrocarbons by Microalgae Isolated Near Bernardo O'higgins Station, North-West Antarctic Peninsula Gayathiri Verasoundarapandian, Siti Aqlima Ahmad, Chiew Yen Wong, Noor Azmi Shaharuddin, Claudio Gomez-Fuentes, and Peter Convey
P44	The Potential of Antarctic Microalgae Isolated from Signy Island for Use in a Light Culture System Approach for Diesel Degradation Siti Hajar Taufik, Siti Aqlima Ahmad, Chiew Yen Wong, Noor Azmi Shaharuddin, Faradina Merican, Khalilah Abdul Khalil, and Peter Convey
P45	Harnessing the Diesel-Degrading Potential of an Antarctic Microalga from Greenwich Island Zheng Syuen Lim, Chiew-Yen Wong*, Siti Aqlima Ahmad, Lai Yee Phang, Faradina Merican, Yih-Yih Kok, and Peter Convey
P46	Biodegradation of Phenol Using Microalgae Isolated from Signy Island, Antarctica Syahirah Batrisyia Mohamed Radziff, Siti Aqlima Ahmad*, Chiew Yen Wong, Lai Yee Phang, Faradina Merican, and Peter Convey
P47	<i>Harmful Algae of Malaysia</i> Normawaty Mohammad Noor, Øyvind Moestrup, Chui Pin Leaw, Po Teen Lim, Grace Joy Wei Lie Chin, and Gires Usup

CONTENTS

Poster number	Title
P48	De novo transcriptomic analyses reveal the upregulation of fatty acid biosynthesis genes in <i>Thalassiosira weissflogii</i> during low salinity cultivation Muhammad Faiz Zakaria, Nor Afiqah Aleng, Mohd Effendy Abd Wahid, Mohd Ghows Mohd Azzam, Tomoyo Katayama, Kazutaka Takahashi, Kamarriah Bakar, Lim Hock Seng, and Malinna Jusoh*
P49	Evaluation on Microalgae for Biochemicals and Bioelectricity Production Farahayu Khairuddin, Nurul Ain A. Talib, Nur Suhanawati M. Ashaari, Azney Zuhaily Md Taib, Siti Fatimah Zaharah Mohd Fuzi*, and Low Kheng Oon*
P50	Synergism Effects of Astaxanthin from <i>Haematococcus pluvialis</i> Microalga with Tocotrienols from Palm Oil and Their Potential as a Therapeutic Agent in Addressing Inflammation Related Diseases Muhamad Helmi Husaini Rusmidi, Khairul Adzfa Radzun, Maliya Azilah Mohamad Aini*, and Sitti Rahma Abd Hafid*
P51	Malaysian Virgin Soil Extracts as Natural Growth Enhancer for Targeted Green Microalgae Species Maegala Nallapan Maniyam*, Hasdianty Abdullah, Mohd Fadzli Ahmad, Emi Fazlina Hashim, Fridelina Sjahrir, and Nor Suhaila Yaacob
P52	Harnessing Antarctic Microalga to Combat Diesel Contamination Amidst Heavy Metal Challenges Wen Xi Goh, Ruo-Shan Tae, Zheng Syuen Lim, Chiew Yen Wong*, Siti Aqlima Ahmad, and Yih Yih Kok
P53	Macroalgae-plastics: a sustainable and biodegradable bioplastic Regina Leong Zhi Ling, Lim Lai Huat, Yeong Hui-Yin, Swee Sen Teo*, and Phang Siew Moi
P54	Pyrolysis: Advancing Liquid Biofuel Production in Microalgae Biorefineries Chan E.W.C.* and Wong C.W.
P55	Modification of anode to enhance power output of the algal biophotovoltaic (BPV) device Jing-Ye Tee, Cheng-Han Thong, Fong-Lee Ng, Siew-Moi Phang, Fiona Seh-Lin Keng, Kamran Yunus, Adrian C. Fisher, and G. Gnana kumar
P56	Biophotovoltaic Platforms: Integrating Algal Biophotovoltaics with Palm Oil Mill Effluent Remediation for Sustainable Energy Jeremy Yew-Joo Gan, Zoe Hui-Yee Tay, Fong-Lee Ng, Siew-Moi Phang, Fiona Seh-Lin Keng, Cheng-Han Thong, Vengadesh Periasamy, Kamran Yunus, and Adrian C. Fisher
P57	The Effects of Low Temperature on Biochemical Properties and Bioactivity of Selected Malaysian Seaweed Species Ong Kuan Hung, Kishneth Palaniveloo, Teo Swee Sen, Shin Hirayama, and Phang Siew Moi
P58	Influence of Salinity and Dark Stress on the Accumulation of Lipids in Microalgae Norhidayah Ahmad Wazir, Yeleeni Kanna Dasan, Uganeeswary Suparmaniam, Hasrizal Abd Rahman, Nurul Farahin Abd Wahab, Muhammad Arif Yahya, Qamarul Hafiz Zainol Abidin, M Ghadafi M Nor, Pauziyah Abd Hamid, and Lam Man Kee

CONTENTS

Poster number	Title
P59	Development of Open Tank Microalgae Harvesting System Integrating Flocculant-Assisted Pump Filtration System Ridhwan Zhafri Kamarul Bahrim, Azima Syafaini Japar, Ahmad Shihan Shaharuddin, Mohsin Jalil, Firmansyah, Syazwan Shukor, M Khairumuzdanial M Khairulanwar, Fatin Alia M Bakri, Norhidayah Wazir, Qamarul Hafiz Zainol Abidin, Zulkarnain Harom, and M Ghaddaffi M Nor
P60	Proposed Development of Algae Performance Determinants by Using Liquid Chromatography and Mass Spectrometry Analysis Technique Qamarul Hafiz Zainol Abidin, Azima Syafaini Japar, M. Salleh Rofie, Teh Lay Kek, Mohd Zaki Salleh, M. Ridhwan Zhafri Kamarul Bahrim, Hasrizal A Rahman, Norhidayah Ahmad Wazir, M Ghaddaffi M Nor, and Pauziyah Abd Hamid
P61	Assessment on Carbon Source Microalgae Biomass Waste as Potential Value Added Material Noorazlenawati Borhan, Chee Sheau Chien, Azima Syafaini Japar, Khalilah Khairuddin, Mah Eng Siang, M Ghaddaffi M Nor, and Pauziyah Abd Hamid
P62	Toward Achieving Pilot Scale: Case Study of Laboratory Extraction from Microalgae Chee Sheau Chien Chee Tee, Noorazlenawati Borhan, Azima Syafaini Japar, Anis Nurdhiani Rosdi, Khalillah Khairuddin, Mah Eng Siang, Zulkarnain Harun, M Ghaddaffi M Nor, and Pauziyah Abd Hamid
P63	Establishment of Genome Editing Techniques in Euglena and Their Commercial Applications Masashi Mizuki, Toshihisa Nomura, Marumi Ishikawa, Keiichi Mochida, and Kengo Suzuki
P64	The Potential of <i>Euglena gracilis</i> for Fundamental Health Enhancement Wataru Okamoto and Ayaka Nakashima
P65	Development of Mass Production Technology for New Algae S. Oyadomari, T. Takeuchi, M. Horiuchi, and R. Nakano

Optimization of extraction procedures for nutritional composition from the marine macroalgae *Ulva lactuca* as a potential cosmetic activity.

Deny Susanti, Muhammad Idham Shukor, Normawaty Mohammad Nor*, Nurul Iman Aminuddin, and Muhamad Taher

International Islamic University Malaysia, 25200, Pahang, Malaysia.

Correspondence: normahwaty@iiium.edu.my

Keywords: Vitamin B12, carotenoids, flavonoids, protein, polysaccharides, two-level factorial design, central composite design

In the current study, the ideal extraction method of bioactive compounds from *Ulva lactuca* was developed and optimised to achieve the maximum yield of extract. The *U. lactuca* algae were investigated for their vitamin B12 content, carotenoids (beta carotene and fucoxanthin), flavonoid (quercetin), protein and amino acid profiles, and polysaccharides (ulvan). The effects of several extraction parameters, including the solvent-to-solvent ratio, solute-to-solvent ratio, pH, duration of extraction and extraction temperature on the total bioactive compounds of interest content, were analysed through a two-level factorial and central composite design. Other pre-treatment of drying methods (sun-dry, air-dry, oven-dry and freeze-dry) were also applied during the extraction procedure. Results showed that *U. lactuca* extract was characterised by a high content of ulvan polysaccharides (32.0 %), followed by proteins (27.3 %), carotenoids, flavonoid and vitamin B12. The polysaccharides of ulvan contain L-rhamnose, xylose and glucose. The proteinic fraction analysis indicated the presence of essential amino acids, which represent 42.0% of the total amino acids. The carotenoids profile was represented by the beta carotene, which about 16.0 % of the total carotenoid content, followed by fucoxanthin (11.0 %). Data analysis resulted in optimal extraction condition were noted at pH value 2.5, 85 °C and 2 h for ulvan polysaccharides, 1:25 g/mL, 3 h, 75 °C for protein, 1:31 g/mL, 84 mins, 32 °C for beta carotene, 1:52 g/mL, 87 mins, 34 °C for fucoxanthin, and 1:52 g/mL, 84 mins, 34 °C for quercetin. The highest vitamin B12 content, particularly cyanocobalamin (CN-Cbl), was recovered through the ultrasonic-assisted extraction (UAE) of oven-dried *U. lactuca* at 3 g:60 mL of solute to solvent and 25:75 % of MeOH to H₂O ratios at pH 4. The extraction of CN-Cbl from oven-dried *U. lactuca* that employed the UAE method has elevated CN-Cbl content recovery compared to other extraction methods.



Organisers



Session Partner



Strategic Partner



University Partners



E-documents



[GAS 2023 e-documents](#)

[Program e-booklet, abstract e-book](#)



Contact us



Address

L1-06, Block 3710 (CoPlace 5),
Persiaran APEC, Cyber 8,
63000 Cyberjaya, Selangor, MALAYSIA

Phone no.

+603 8320 5286
+6018 2233 230

Email

info-asia@lne.st

Website

<https://global.lne.st>

Social medias



Leave a Nest Group

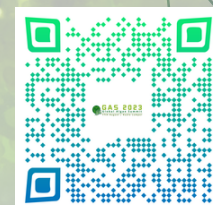


Leave a Nest Malaysia
Sdn. Bhd.



Leave a Nest Asia

Feedback form*



*An e-certificate will be issued exclusively upon the completion of the feedback form